Mission Support Functional Programs

New Project Number	Title	Previous Project Number(s)	Page Number
M02	Technical Support Services	26-19	Mission Support-3
M03	Capital Investment Plan System Engineering	36-13	Mission Support-3
M04	National Airspace System In-Plant Contract Support Services (NAS/IPCSS)	36-23	Mission Support-5
M05	NAS Regional/Center Logistics Support Services	36-24	Mission Support-6
M07	NAS Infrastructure Management System (NIMS)	26-01, 26-04, 46-01, 46-04	Mission Support-7
M08	Continued General Support • ANF/ATC Support (Quick Response) • Inservice Engineering • Acquisition Process Streamlining • Air Navigation Aid Facilities, Local Projects • Regional Projects • Program Support Leases • FDIO Phase II COTS Replacement • Digital Charting • Improve En Route Automation • Alaska Volcano Monitoring • Resource Tracking Program (RTP) • Year 2000 (Y2K) Computer Problem • Modernization of Procurement Automation System (Acquire) • Time Code Displays (TCD) • Infrared Deicing • Omega Termination Costs • Replenishment Spares • Display System Replacement Training Simulator • Wind Anemometers • NAS Requirements Development Support • Next-Generation Gyroscope • Operations Concept Validation • System Capacity, Planning and Improvements	46-16 New New Completed 1998 New New New New New	Mission Support-8
M10	Distance Learning	56-02	Mission Support-13

Mission Support Functional Programs (Continued)

New Project Number	Title	Previous Project Number(s)	Page Number
M11	Aircraft Fleet Modernization • Research and Development Aircraft Modernization	56-11 New	Mission Support-14
M12	Aircraft Related Equipment Program	56-12, 56-13	Mission Support-15
M13	Precision Automated Tracking System (PATS)	56-16 Complete 1998	Mission Support-18
M15	Spectrum Engineering Management	56-15, 56-26	Mission Support-18
M17	Test Equipment Modernization and Replacement	56-27	Mission Support-20
M18	Computer Resources Nucleus (CORN)	56-15, 56-26	Mission Support-20
M20	NAS Training Modernization	56-35	Mission Support-21
M21	Asset Supply Chain Management • National Bar Coding	56-37 New	Mission Support-22
M22	NAS Implementation Support	56-47	Mission Support-24
M24	National Aviation Safety Data Analysis Center (NASDAC)	56-52	Mission Support-25
M25	Independent Operational Test and Evaluation (IOT&E)	56-55	Mission Support-26
M26	NAS Management Automation Program (NAS-MAP)	56-56	Mission Support-27
M27	National Airspace Integrated Logistics Support (NAILS)	56-58	Mission Support-28
M28	FAA Corporate Systems Architecture	56-61	Mission Support-29
M29	Air Traffic Operational Management System (ATOMS) Local Area Network/Wide Area Network	45-25	Mission Support-32
M31	NAS Information Security System (NISS)	New	Mission Support-33
M33	Advanced Airport Security Systems	New	Mission Support-34
M34	Airport Technology	New	Mission Support-36
M35	General Aviation and Vertical Flight Technology	New	Mission Support-38
M36	Alaska Capstone Initiative/Safe Flight 21	New	Mission Support-39
M37	Cockpit Technology	New	Mission Support-40

M02–Technical Support Services

Program Description: The program provides a contractual vehicle for procuring technical services to supplement regional, FAA Aeronautical Center, and FAA Technical Center facilities and equipment (F&E) staff efforts necessary to modernize the National Airspace System (NAS). The NAS modernization schedule creates peak implementation workload requirements on FAA region and center organizations, which cannot be accommodated within current and projected FAA staffing levels. A national technical support services contract (TSSC) was awarded to provide a means for regions and centers to obtain the technical support needed to accomplish their F&E mission. The contract has a 3-year base performance period and two optional 2-year performance periods. Support services available under TSSC include site selection analysis; site preparation and construction; equipment installation and testing; equipment tuneup, modification, and testing; equipment/site refurbishment; and site/facility environmental remediation.

Each work effort under the TSSC is issued to the contractor via a work release that may cover any portion of the "hands-on" effort necessary to complete a particular project, including construction. Most work releases are issued and managed within the regions. National work releases are issued and managed by FAA Headquarters when the work involves multiple regions. The contract structure enables the contractor to begin work within 30 days following issuance of a contract modification. Most F&E-funded projects

may be considered for implementation support under this contract.

Funding to support the contractor's labor- and travel-related costs associated with performing projects assigned with a work release is provided on a national basis via this project. Construction, travel, and other non-labor-related project costs are provided by the other F&E projects described in the CIP. The FAA has options to extend the term of the contract.

Products:
- Support contract
- Level-of-effort NAS implementation resources.

Accomplishments (1/97–9/98):
- Closed out the TSSC-I contract
- Awarded first optional performance period (10/97)
- Provided approximately 1,000 technical and engineering personnel for national and regional support per year.

Sponsor Organization:
- AAF-1, Airway Facilities Service.

Performing Organization:
- ANS-100, NAS Planning and Support Division, NAS Transition and Integration.

Contractors:
- Raytheon Services Company Washington, D.C.

Schedule: M02 - Technical Support Services

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
		• MNS 229 Approved (TSARC)																	
			• Contract Award																
						• Option I Start													
								• Option I Ends											
								• Option II Start										
									• Option II Ends								

M03–Capital Investment Plan System Engineering

Program Description: The FAA lacks sufficient in-house systems engineering, mission analysis, investment analysis, and program management staff to meet the demand created by the NAS modernization effort. Additionally, the FAA needs a capability to

maintain and enhance CIP automated program management tools for financial management, program schedule baselining, and program decision support. Funding is provided to start new capital investment prior to individual program approval.

The program includes:

System Engineering and Technical Assistance (SETA). The project provides technical expertise in NAS architecture, system engineering, mission analysis, investment analysis, and program management for CIP projects. The technical expertise includes requirements definition, operational analysis, operational concept development, system engineering, software engineering, configuration management, operational testing and evaluation, economic analysis, and interface management.

A key task is to translate general performance requirements established by users into quality investment decisions, and into plans for final, workable systems. This includes system designs, prototypes, integration, and implementation strategies to ensure efforts are accomplished within acceptable parameters of cost, benefits, schedule, and technical capabilities.

Contracts are awarded to provide the technical and scientific expertise and software engineering support necessary for capital investment projects. The project also provides local area network (LAN) support for CIP projects.

Federally Funded Research and Development Center (FFRDC). This project provides support for the FAA's Federally Funded Research and Development Center, the Center for Advanced Aviation System Development (CAASD). Based on a memorandum of understanding (MOU) with MITRE Corporation, the FAA sponsors MITRE to operate the FFRDC. CAASD performs the studies, analyses, and concept formulations for continued advanced aviation research for the CIP and the NAS. The establishment of a stable source of funding, along with a long-term contractual relationship, is in the best interest of the public and the FAA. It fosters stability, establishes economies that can only be supported with an established workforce, and provides continuity of services for efficient and effective use of an experienced professional staff within the target field of aviation research. Near-term research and analysis is planned in the following areas:

- Free Flight Phase 1
- Communications, navigation, and surveillance (CNS) operational capability
- Navigation architecture
- NAS architecture implementation
- Airspace design and analyses

- User performance planning and research
- NAS integration.

Products:

SETA:

- System engineering support and annual updates for the NAS Architecture, CIP, and R,E&D Plan
- Program management and software engineering support for the CIP and the R,E&D Plan
- Investment Analysis Reports for JRC decisions
- Operational studies and concepts
- Mission analysis support
- Benefit-cost analyses
- Requirements development support.

FFRDC:

- Communications architecture and system design
- Data link requirements and system definition
- Surveillance processing and concept alternatives
- Weather requirements analysis and validation
- Advanced design and operations research support
- Terminal air traffic control (ATC) automation
- Satellite navigation/Global Positioning System (GPS) integrity
- Airport capacity research.

Accomplishments (1/97–9/98):

SETA:

- Published 1997 CIP, 1997 and 1998 R,E&D Plans, and NAS Architecture 1997 (Version 3.0)
- Completed Investment Analysis Reports
- Developed NAS Change Proposals.

FFRDC:

- Developed navigation architecture for transition to satellite-based navigation systems
- Researched low-cost avionics benefiting Free Flight paradigm
- Developed system architecture for implementation of data link infrastructure
- Continued investigating procedures, user needs, system requirements, and architecture implications for enhanced information systems

- Developed new air traffic management and control operating concepts evaluation and/or infrastructure replacements.

Sponsor Organizations:

- ASD-1, System Architecture and Investment Analysis

- ARA-1, Research and Acquisition

- ATS-1, Air Traffic Services.

Performing Organization:

- ASD-10, Resource Management Staff, System Architecture and Investment Analysis.

Contractors:

- TRW
  Fairfax, Va.

- MITRE CAASD
  McLean, Va.

- CEXEC
  McLean, Va.

- Fu Associates
  Arlington, Va.

- Crown Communications, Inc.
  Washington, D.C.

- Stanford Telecommunications, Inc.
  Reston, Va.

- Advanced Management Technologies, Inc.
  Washington, D.C.

- Adsystech
  Washington, D.C.

- Lincoln Labs
  Cambridge, Mass.

- Transportation Systems Center
  Cambridge, Mass.

- CSSI, Inc.
  Washington, D.C.

Schedule: M03 - Capital Investment Plan System Engineering

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• MNS 264 Approved						Continuing Effort												→

M04–National Airspace System In-Plant Contract Support Services

Program Description: The FAA has a shortage of personnel with experience in Government contracting needed to handle the demands created by the NAS modernization effort. It also lacks the means to perform an independent evaluation of contract performance.

This program provides contract procurement and production personnel to represent FAA interests for designated acquisition contracts. NAS/IPCSS personnel will review and evaluate contractor proposals, monitor production efforts, report status of contract deliverables, and monitor compliance with contract specifications. In addition, personnel provide the FAA with better data to assess contract activities and evaluate progress.

Products:

- Contract procurement and production personnel

- Monthly status reports.

Accomplishments (1/97–9/98):

- Provided direct support for the following programs: security detection equipment, AMASS, OASIS, NIMS, NISC II, Acquire, ES2 to Host sustainment, STARS, DSR, WAAS, VSCS, DCCR, Oceanic, ARTS IIIE, Aircraft Modification, ARSR-4, MODE-S, SETA, TSSC II, Data Link Processor, and ERMS.

Sponsor Organization:

- ASU-1, Office of Acquisitions.

Performing Organization:

- ASU-130, Procurement and Management Branch, Acquisition Policy and Procedures Division.

Contractors:

- CEXEC
  McLean, Va.

Schedule: M04 - National Airspace System In-Plant Contract Support Services (NAS/IPCSS)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- • Base Contract Award
- • Base Contract Ends
- **Follow-On Contract**
- • Acquisition Strategy Decision
- • Contract Award
- • Contract Ends

M05–NAS Regional/Center Logistics Support Services

Program Description: The FAA lacks sufficient logistics specialists in the regions to accommodate the demands of the NAS modernization effort and increased operations activities. The regional logistics divisions' workload is increasing, primarily in the areas of contracting, materiel management, and real property acquisition and management.

This program provides contracted specialists in logistics to assist the FAA's region and center personnel with procurement, real estate, materiel management, and automated data processing services in implementing CIP projects.

Products:
- Contract logistics specialists
- Status reports
- Administrative assistance to support logistics functions
- Pre-award/post-award contract assistance
- Automated data processing support for logistics data bases and software.

Accomplishments (1/97–9/98):
- Supported site acquisitions for various NAS programs
- Contracted for utility services
- Provided support for the TSSC-I Raytheon close-out process
- Supported relocation of the Central Region Regional Office
- Provided contracting support for the Contract Weather Observer site leases and service contracts assumed from National Weather Service
- Provided space management support for centers and regions
- Developed a cross-reference system for the Radio Communications Link (RCL).

Sponsor Organizations:
- AAF-1, Airway Facilities Service
- ARC-1, Region/Center Operations.

Performing Organization:
- ASO-50A, Southern Region Logistics Division.

Contractors:
- CEXEC
  McLean, Va.
- Automated Information Management
  Lanham, Md.

Schedule: M05 - NAS Regional/Center Logistics Support Services

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- • Contract Award
- • Contract Ends
- **Follow-On Contract**
- • MNS 232 Service Life Extension Approved
- • Contract Award
- • Contract Ends

M07–NAS Infrastructure Management System (NIMS)

Program Description: There is a pressing need to migrate the operation and management of the NAS infrastructure from the current equipment maintenance philosophy to one focused on managing and delivering NAS air traffic control (ATC) and advisory services to system users. Currently, Airway Facilities Service (AAF) is operating under a philosophy of equipment maintenance, focusing on the operation and repair of each individual NAS system and subsystem, without regard to the criticality or priority of the individual system to the NAS. This philosophy has worked over the years because thousands of Airway Facilities (AF) field specialists have been available to service the FAA's numerous equipment at the hundreds of facilities across the Nation.

The FAA needs to expand capabilities within the NAS to meet the increasing demands for ATC and advisory services. In addition, maintaining the system with the current number of AF field specialists becomes problematic, as evidenced by the growing mean time to restore (MTTR). Maintaining the system in accordance with the current strategy could result in decreased capacity, reduced levels of service available to ATC services, and increased costs.

The NAS Infrastructure Management System (NIMS) provides the means to migrate the FAA's equipment maintenance philosophy to a service management philosophy. Building on the remote maintenance monitoring system concept—but incorporating modern, commercially available management tools—NIMS will establish a national operations control center (NOCC) and three strategically located operations control centers (OCC). NIMS will concentrate information and technical expertise to ensure the continued operation of the NAS by directly associating NAS infrastructure components with the delivery of specific NAS services. NIMS will enable the FAA to track and monitor the actual cost of providing NAS services and to assess trends.

The NIMS program will employ a phased implementation approach based on the managed evolutionary systems development concept. The program has three phases.

- NIMS Phase 1 will provide the building blocks for a service-based management system. While providing additional remote monitoring and control to new equipment, Phase 1 will integrate existing element management systems, telecommunications systems, and leased mobile communications for the AF workforce. NIMS will also introduce modern commercial-off-the-shelf (COTS) resource management tools and information security controls.

- NIMS Phase 2 will expand the service management philosophy by providing centralized management of assets that support NAS service delivery, NAS customer and user interaction tools, and technical and cost trend analyses. It will also provide a refinement of Phase 1 capabilities, including a COTS enterprise management tool or legacy system upgrade.

- NIMS Phase 3 will provide intelligent fault correlation, information sharing, and modernization and refinement of prior phase capabilities. Service management will be further enhanced by providing the capabilities to perform predictive maintenance and analysis.

Products:
- One NOCC
- Three OCC's
- Up to 40 Service Operations Centers (SOC)
- 300 Work Centers
- COTS/nondevelopmental item (NDI) hardware and software to provide:
  - NAS Infrastructure Services Modeling
  - NAS Monitoring
  - NAS Control
  - NAS Performance Management
  - Event Management
  - Fault Management
  - Resource Management.

Accomplishments (1/97–9/98):
- Awarded Integrated Services Contract (ISC) to Raytheon Information Services Company
- Connected 3,373 remote sensors
- Delivered 171 mandatory Environmental Remote Monitoring Subsystems (ERMS)
- Delivered the NIMS premier facility (NPF) and NIMS Build I software
- Delivered 1,700 maintenance data terminals to AF field specialists
- Completed the NIMS architecture and system design

- Completed the NIMS security plan, vulnerability assessment, and protection profile
- Completed the COTS trade study, and selected MAXIMO as the NIMS resource management software tool.

Sponsor Organization:

- AAF-1, Airway Facilities Service.

Performing Organization:

- AND-130, NAS Infrastructure Management System Product Team.

Contractors:

- Raytheon Information Services Company.

Schedule: M07 - NAS Infrastructure Management System (NIMS)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- NIMS MNS 145 Approved
- NIMS KDP2 Joint ARC/TSARC
  - NIMS Operational Requirements Document Approved

Phase 1 APB Approved by JRC

- NIMS Premier Facility Build 1
  - NIMS Premier Facility Build 2

Phase 1 APB Rebaseline Approval by JRC

- Phase 1 IOC
  - Phase 1 FOC

Phase 2 APB (Pending Investment Analysis)

M08–Continued General Support

Program Description: The program provides a flexible mechanism for initiatives and activities that occur annually but cannot be accurately forecast. It also provides funding for unexpected short-duration projects that must be handled expeditiously in order to minimize the impact to NAS operations. These projects include:

ANF/ATC Support (Quick Response): Provides the resources necessary to meet unexpected demands for system repair and improvements due to unforeseen events and the ability to respond to new initiatives without affecting funding of other programs.

Inservice Engineering: Provides inservice engineering support in response to unexpected and urgent requirements needing engineering, design, and analysis.

Acquisition Process Streamlining: Provides contract support to develop the new FAA Acquisition Management System (AMS). It includes developing effective new policy and standards, tailoring the process for specialized procurements, developing streamlined planning and procedure documents, developing computer-based support tools, developing metrics to assess program improvements, and training FAA management and acquisition workforce in the new system.

Air Navigation Aid Facilities, Local Projects: Provides for various unexpected site-specific, low-dollar-value regional requirements for the over 30,000 commissioned facilities and systems throughout the United States. The requirements are of a nonrecurring nature. It provides discretionary funding to the field, enabling a flexible response to unplanned safety, delay, workplace, and implementation problems.

Regional Projects: Provides funding for region-oriented projects not listed as national programs. Provides regions with the only vehicle for submitting requests for additional positions, data display systems, communications equipment, security systems, new consoles, and small improvement projects. The program has been expanded to meet requirements mandated by public law and Executive order for facility accessibility and structural/nonstructural seismic reinforcement of occupied Federal buildings. Without this project, most national program improvement projects would need to be expanded.

Program Support Leases: Provides for paying for existing leases for land and space that directly support NAS operations and its infrastructure. The scope of this program includes converting existing leases to purchases when either cost-effective or under options or provisions in FAA leases. Funding is also pro-

vided for costs associated with certain facility decommissions, including all nonhazardous material types of site restoration activities included in the lease agreements.

FDIO Phase 2 COTS Replacement: Replaces current proprietary flight data input and output (FDIO) systems with commercial-off-the-shelf (COTS) system components.

Digital Charting*:* Provides accurate and timely digital aeronautical chart data to support air traffic operations. Supports CIP programs that require digitized maps.

Improve En Route Automation: Provides hardware and software upgrades to increase en route system reliability and enhance ARTCC operations until system replacement.

Alaska Volcano Monitoring: Provides equipment and data transmission facilities to monitor suspect volcanoes in Alaska. Congressional add in FY 1996, 1997, 1998, and 1999.

Resource Tracking Program (RTP): Provides an automated tool that is used by the NAS Implementation Directorate (ANI) for project management and F&E budget submissions to the annual call for estimates. Also provides annual reports for headquarters program offices on commissioning, F&E staffing, and other developments.

Year 2000 (Y2K) Computer Problem**:** Provides for the assessment, renovation, validation, and implementation of all FAA systems that are not currently Y2K compliant. The Y2K problem results from the way computer systems store and manipulate dates. The types of systems that will be affected include mainframes, client/servers, networks, workstations, distributed systems, telecommunication systems, radar processors, and communication processors. The software that will potentially be affected includes both application software and system software. Data bases and files that store two-position year fields could also be affected.

Failure to process the dates properly could lead to serious failures—immediate and long-term. The Y2K problem is not a technical problem that is difficult to solve. However, due to the large number of systems, languages, and platforms that the FAA uses, the solution requires a major coordination effort.

Systems in the FAA inventory are divided into two categories: Mission-Critical, those systems whose failure would have a critical impact on the opera-

tional capacity of the FAA or systems that support a core business activity or process within the FAA, and Non-Mission-Critical, those systems whose failure would have no serious impact on the NAS. This categorization allows the FAA to prioritize system repairs and, if necessary, reallocate resources to the more critical systems. The FAA has a total of 638 systems of which 425 are mission critical and 213 are non-mission critical. Of the 638 systems, 327 do not have a Y2K problem.

In February 1998, the FAA established a centralized Y2K Program Office to manage the program across the agency. The agency's repair process, which is based on guidance from the General Accounting Office (GAO), requires that all FAA systems undergo a five-phase (i.e., awareness, assessment, renovation, validation, and implementation) Y2K repair process. Through this process, all FAA systems will be certified as Y2K-compliant on or before June 30, 1999.

To be certified and reported Y2K-compliant, all systems must either undergo the five phases described above or must have documentation showing that one or more of the phases is not required. All system owners are provided with a handbook that is a guide to the repairing individual systems. System owners are also provided with support from repair process experts from the FAA Y2K Program Office.

Modernization of Procurement Automation System (Acquire)**:** Addresses the need for an efficient and effective procurement process and procedures that will support the FAA's AMS. Current automated procurement processes, known as the System for Acquisition Management (SAM) and the Procurement Automated System (PAS), are based on the Federal Acquisition Regulation and do not support the AMS. They must be replaced to achieve the benefits of acquisition reform. They are also technologically obsolescent.

The specific Acquire product to be delivered over a 5-year life cycle at 12 sites includes the procurement of COTS software, customization of software to meet FAA needs, implementation of software and hardware servers, training, and maintenance services. When fully implemented, the Acquire program will support a minimum of 5,000 users with online access privileges. Acquire will also enable more effective interfaces with the Departmental Accounting and Financial Information System (DAFIS), the Contract Information System (CIS), and the Logistics and Inventory System (LIS).

Time Code Displays (TCD): Replaces TCD units within the NAS. Accurate time in the NAS is critical for safe and efficient air traffic flow management. Departure time, arrival time, and position of an aircraft with respect to other aircraft depend on accurate coordination of time. The recorded mean time between failure (MTBF) for the TCD's operated in the NAS exceeded the TCD specification requirements.

Infrared Deicing: Provides demonstration and prototyping of infrared heating for aircraft deicing at Rhinelander/Oneida County Airport in Wisconsin. Congressional add in FY 1998.

Omega Termination Costs: Provides capital funding for Omega transferred from the Coast Guard to the FAA in FY 1998. Congressional add in FY 1998.

Replenishment Spares: Provides air traffic control system spares to support NAS handoff to inservice management. OST/OMB adjustment in FY 1998.

Display System Replacement Training Simulator: Provides simulator training system procured by the Mid American Resource Consortium (MARC) to support air traffic control training. Congressional add in FY 1998 and 1999.

Wind Anemometers: Provides wind profilers at Juneau, Alaska. Congressional add in FY 1996, 1997, and 1998.

NAS Requirements Development Support: Provides support to mission analysis and NAS requirements development efforts to direct NAS modernization and other capital investments.

Next-Generation Gyroscope: Develops a low-cost, next-generation precision gyroscope, which in turn will enable development of a low-cost inertial navigation system (INS). The FAA is responsible for the operation of the NAS. Integral to the NAS are the various communications, navigation, and surveillance (CNS) components. As part of the FAA's NAS modernization, the Global Positioning System (GPS) has been selected as the primary navigation system for the future NAS. The FAA is currently evaluating the need and possible candidates for a backup navigation system for GPS. INS is a potential candidate for such a backup system, as it offers many features similar to GPS and would therefore be a relatively seamless transition from one system to the other. However, its general use is cost-prohibitive using current gyroscope technology. The development of low-cost precision gyroscopes would permit INS to be an affordable backup navigation system and would enhance the safe and efficient operation of aircraft in the modernized NAS. The FAA will be supported by the University of Alabama. Congressional add in FY 1999.

Operations Concept Validation: Provides integrated guidance to the aviation community for the development and transition to a modernized NAS. This guidance includes system specifications, roles and responsibilities, and procedures, training, and certification requirements. RTCA, the FAA R,E&D Advisory Council (REDAC), the White House Commission on Aviation Safety and Security, and other members of the aviation community are developing and validating a concept of operations (CONOPS) for NAS modernization. This CONOPS will be the driver and integrator in transitioning from the current rigid procedures and obsolescent infrastructure to a Free Flight environment. The RTCA Task Force 3 provided the modernized NAS capability descriptions sought by the user community. The validated CONOPS describes how the two parts of the NAS, ground and air, interact to provide the capabilities while transitioning to a new infrastructure involving planners, pilots, service providers, and systems.

System Capacity, Planning and Improvements: Contains three projects—Aviation System Capacity Planning, Separation Standards, and the Airspace Labs. Increases the capacity of the U.S. aviation system to meet customer demand for aviation service. To do this, evaluation must be improved and future capacity enhancements must be implemented for airport expansions, facilities and equipment improvements, airspace redesigns, and new operational procedures. Twenty-seven major metropolitan airports currently experience over 20,000 hours of delay annually due to capacity restraints. Projections show 31 airports will experience 20,000 hours of delay annually by 2007. The extensive delays within terminal and en route airspace compound the problem.

The Aviation System Capacity Planning project focuses on identifying operational capacity problems. This work will lead to the development of improved analysis and new performance measures to evaluate the complex cause-and-effect relationship between (1) the effectiveness of air traffic services and operational efficiencies provided to their customers and (2) the enhancements proposed to increase aviation system capacity.

The Government Performance and Results Act of 1993 (GPRA) requires the FAA to set annual goals with measurable target levels of performance. In response, Air Traffic Services (ATS) must identify and

evaluate alternative operational outcome measures, develop performance indicators and strategies for each outcome in the ATS Performance Plan, and establish and model relationships between system-level outcomes and facility-level metrics.

The Office of System Capacity has been designated the focal point for all activities related to ATS performance measurements, including the development of performance metrics, and the establishment and design of concepts for future performance measures.

Measurement activities include:

- Identification of performance measures designed to demonstrate the interface between critical airports and the NAS

- Development of facility-level measures to identify the interrelationships between the airspace system and the remainder of the NAS

- Improvement and refinement of safety, flexibility, predictability, access, delay, and associated indicators

- Expanding capacity models and analysis to include more than delay (i.e., flexibility, access, and predictability).

The Office of System Capacity is also striving to ensure that capabilities to be delivered by the NAS Architecture will be integrated into the airport capacity planning process.

Efforts to ensure NAS modernization through capacity planning studies include:

- Increasing capacity and efficiency at major airports and terminals

- Developing metrics to determine if airport capacity improvements maximized the benefit and timely deployment of new NAS capabilities

- Measuring the effect of NAS modernization on various airports

- Integrating future airport and NAS concepts of operations into capacity strategies

- Redesigning terminal airspace to provide for the flexibility necessary to maximize use of new avionics, improved surveillance and air traffic control decision support tools.

Separation Standards provides for regional traffic and aircraft performance monitoring and analysis.

The Airspace Labs focuses on airspace redesign and its supporting technology as part of the Agency's Air Traffic plan to improve National Airspace System ef-

ficiency while sustaining high levels of safety. The Air Traffic Airspace Program office is responsible for airspace redesign and traffic management performance analysis.

Free Flight Phase 1 core capabilities deployment (FFPI CCLD), which are expected to improve system performance and enhance flexibility and predictability, will rely on airspace restructuring. The Airspace Lab is developing a modeling and simulation tools network, which includes environmental noise impact analysis tools, to support airspace redesign planning and analysis.

Products:

- Air navigation facility (ANF)/air traffic control (ATC) facility leases

- Restoration projects due to emergencies or natural disasters

- Small project funding support

Year-2000 Computer Problem:

- Y2K compliance of each FAA system

- Certificates of Y2K compliance for each FAA system

- Y2K deliverables for each FAA system (Assessment Plan, Renovation Plan, Contingency Plan, Validation Plan, Validation Results Report, Implementation Plan, Implementation Results Report) for documentation purposes

Acquire:

- Modernization of Procurement Automated System (Acquire), including installation, training, documentation, server hardware, and system software

Coded Time Source:

- Coded time source (CTS) subsystem

Flight Data Input/Output

- Flight strip printer

Operations Concept Validation:

- Validated operational concept, based on system modeling and simulation

- Validated, integrated, configuration-management requirements for Free-Flight subsystems

- Top-level designs for new air traffic management (ATM) capabilities and subsystems associated with the operational concept.

Aviation System Capacity Planning:

- Complete analysis of new and/or additional performance measures for Air Traffic Services

- Complete airport design studies at Newark, San Diego, and Tampa; and ground analysis at Salt Lake and Las Vegas

- Complete redesign/analysis of Phoenix and Las Vegas terminal airspace.

Accomplishments (1/97–9/98):

- Funded rent for 3,500 land leases and 500 space leases

- Negotiated and funded expansion of the Air Traffic Control System Command Center

- Funded purchase of 30 leased land sites

- Concluded agreements for construction and leaseback of new ATCT/TRACON facilities at Albany, N.Y., and Moses Lake, Wash.

Year-2000 Computer Problem:

- Completed inventory of all FAA systems for Y2K

- Developed initial cost estimates for FAA Y2K repairs

- Completed Assessment Phase activities for all FAA systems

- Completed Renovation Phase activities for all FAA systems.

Acquire:

- Awarded Acquire contract

- Initiated configuration of Acquire system

- Established Acquire IOC.

Operations Concept Validation:

- Developed and published the *Government/Industry Operational Concept for Free Flight,* RTCA, August 1997, and *A Concept of Operations for the National Airspace System in 2005,* Air Traffic Services, September 1997.

Aviation System Capacity Planning:

- Completed trial analysis of performance measures at Dallas-Fort Worth

- Completed airport redesign updates at Miami, Memphis, and Reno

- Completed design of enhanced approach procedures for Los Angeles International Airport

- Completed analysis of new and/or additional performance measures for Air Traffic Services

- Completed airport design studies at Newark, San Diego, and Tampa; and ground analysis at Salt Lake and Las Vegas

- Completed redesign/analysis of Phoenix and Las Vegas terminal airspace.

Sponsor Organizations:

- AOA-1, Office of the Administrator

- AAF-1, Airway Facilities Service

- AAT-1, Air Traffic Service

- ARA-1, Research and Acquisition

- ARC-1, Region/Center Operations

- ASC-1, System Capacity.

Performing Organizations:

- AOA-4, FAA Y2K Program Office

- AUA-200, IPT for En Route Air Traffic Systems Development

- AIT-200, Acquire Product Team, Office of Information Technology

- Various national and regional offices

- ASC-1, System Capacity.

Contractors:

- Multiple contractors determined locally.

Aviation System Capacity Planning:

- ATAC
  Sunnyvale, Calif.

- FU Associates
  Arlington, Va.

- JIL Information Systems, Inc.
  Vienna, Va.

- ARP Inc.
  Chicago, Ill.

Schedule: M08 - Continued General Support

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

ATC/NAVAID Leases ➤

Small, Short-Duration Projects ➤

- Automated Radar Tracking System Enhancements
  - Complete HOST/DARC Upgrade

Acquire
- Initial Operating Capability
  - Final Operating Capability

Year 2000
- Completed Assessment Phase
  - Completed Renovation Phase
    - Complete Validation Phase
    - Complete Implementation Phase

Aviation System Capacity Planning
Performance Measurements

Aviation Capacity Enhancement Plan

Capacity Initiatives

Air Traffic Ground Operations Support

M10–Distance Learning

Program Description: Although facilities and equipment (F&E) funding is no longer associated with this program, future F&E funding is being proposed to support a common infrastructure for the FAA's distance learning capability. The FAA has an increasing requirement for technical and management training based on accelerated implementation of many NAS program, attrition, and other operational requirements. This program procures hardware and software to deliver computer-based instruction (CBI) at more than 1,000 FAA facilities. Distance learning delivery methods increase training effectiveness, increase training opportunities for FAA employees, allow more flexible training schedules, and decrease the time employees spend away from their work sites. The major benefit of CBI is the substantial reduction in travel and per diem expense associated with resident-based training.

Products:

- CBI equipment and courseware.

Accomplishments (1/97–9/98):

- Performed service life extension modification to 1,600 1992 vintage CBI platforms

- Purchased and deployed 400 additional CBI platforms

- Completed 15 additional courseware upgrades

- Executed Letter of Agreement to deliver VSCS training and backup switch (VTABS) initial and transition training

- U.S. Navy adopted the FAA computer-managed instruction (CMI) system and is sharing upgrade costs

- Upgraded compact disk-read only memory (CD-ROM) mastering system.

Sponsor Organization:

- ARC-1, Region/Center Operations.

Performing Organization:

- AMA-1, Program Director, FAA Academy.

Contractors:

- AT&T and GE Spacenet
  Atlanta, Ga.

- Telos
  Ashburn, Va.

- SIGCOM
  Greensboro, N.C.

- York Telecom
  Eatontown, N.J.

- Vertex Solutions
  Falls Church, Va.

- Advancia
  Lawton, Okla.

Schedule: M10 - Distance Learning

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

AT/AF/FS Computer-Based Instruction Expansion
- Phase 1 Completed
- Phase 2 Completed

CBI Platforms
- Development Platforms

Replacement of 1992 Vintage Platforms—Delayed Pending Funding

Courseware
- Courseware Conversions and DVD Upgrades

Network Infrastructure
- Central Training System
- Completed WAN/Intranet Upgrade

M11–Aircraft Fleet Modernization

Program Description: This program addresses modernization efforts for aircraft operated by the FAA.

Flight Inspection Aircraft. The FAA is experiencing shortcomings with its flight inspection aircraft due to increasing age and obsolescence. These older aircraft require more maintenance, resulting in excessive downtime that limits mission capability. The FAA also has maintenance and operational inefficiencies from operating a fleet of diverse aircraft types.

This project acquires new flight inspection aircraft to overcome the shortcomings of the existing fleet. The new aircraft will replace obsolete aircraft whose upgrade costs exceed derived benefits. The new aircraft will:

- Have sufficient range and capability to perform international flight inspection mission requirements

- Be more fuel efficient

- Require less maintenance.

Research and Development (R&D) Aircraft. The FAA is experiencing shortcomings with its R&D air-craft due to increasing age and obsolescence. The older aircraft, dedicated to FAA's R&D mission, have limited mission capability because of increased maintenance that results in excessive downtime. Also, some of the R&D aircraft have obsolete avionics systems, negating their efficient use for research and development of emerging, modern communications, navigation, and surveillance systems.

This project acquires new aircraft to overcome the shortcomings in the older R&D aircraft—replacing obsolescent aircraft where upgrade costs exceed derived benefits. Additionally, these new aircraft would have sufficient range and capability to perform international research and development requirements. The new aircraft will:

- Be more fuel efficient

- Require less maintenance

- Employ digital avionics systems that improve mission productivity.

Products:

- Replacement of aging flight inspection aircraft to date

- One long-range/high-altitude transport category jet aircraft with digital avionics systems to support the R,E&D mission.

Accomplishments (1/97–9/98):

- Conducted PAT&E for medium-size aircraft
- Completed OT&E for large-size aircraft
- Delivered two medium-size aircraft for a total of six
- Delivered one large aircraft for a total of three
- Relocated program Office from Washington, D.C., to Oklahoma City, Okla.

Sponsor Organizations:

- AAF-1, Airway Facilities Service

- ARA-1, Research and Acquisitions
- AVR-1, Regulation and Certification.

Performing Organizations:

- Aircraft Fleet Modernization IPT
- AVN-1, Aviation Systems Standards.

Contractors:

- E-Systems
  Greenville, Tex.

- Learjet, Inc.—prime contractor
  BAAS—subcontractor
  Wichita, Kans.

Schedule: M11 - Aircraft Fleet Modernization

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

Flight Inspection Aircraft
- MNS 107 Approved
- Contract Award
- First MSR Aircraft Delivered
- First LSR Aircraft Delivered
- Deliver Last Aircraft
- Project Ends

Research and Development Aircraft
- MNS 328, **Pending Mission Need Analysis**

M12–Aircraft Related Equipment Program

Program Description: This program provides major upgrades to aircraft/aircraft systems as necessary to support the agency's four flight program missions:

- Flight inspection (31 aircraft)
- Research and development (R&D) (six aircraft)
- Training (six regional aircraft and FAA Academy flight simulators)
- Flight support (six regional aircraft and four aircraft at Hangar 6—Ronald Reagan Washington National Airport).

The six regional aircraft are used as dual-purpose aircraft.

This program is composed of a variety of projects required to respond to national security and/or public safety issues year after year. Individual projects are segmented with milestones as requirements materialize. Each project usually has one or more multiple contracts. Most program requirements are driven by safety mandates from Federal Aviation Regulations (FAR), FAA-sponsored International Civil Aviation Organization (ICAO) standards, National Transportation Safety Board (NTSB) recommendations, and Congressional mandates in Office of Management and Budget (OMB) circulars. The program supports these major missions:

Flight Inspection. Flight inspection aircraft:

- Validate instrument approach flight procedures and electronic signals emitted from navigational equipment
- Provide emergency and other support to DOD to flight-inspect military equipment deployed internationally
- Provide worldwide flight inspection services to foreign governments under international agreements with the U.S. Department of State.

These aircraft contain a complement of technically sophisticated equipment used to validate electronic data from NAS facilities. As new technologies evolve in the NAS, the FAA aircraft must be equipped accordingly to provide corresponding requirements for flight inspection services. In addition, agency aircraft must abide by the same FAA rules and regulations (FAR Part 135) imposed on commercial carriers. Pending aircraft deliveries will increase the fleet size to 34 by the year 2000. This project will outfit these new aircraft with specialized flight inspection equipment.

Research and Development (R&D). Agency R&D aircraft are based at Atlantic City, N.J. These aircraft perform various tests and evaluations of latest technology equipment using airborne platforms as required by the R&D community. With only a few exceptions, the aircraft are full-development FAR-125-certified aircraft.

Training. Training aircraft operated by the Flight Standards Service in the regions and flight simulators at the FAA Academy provide pilot training to aviation safety inspectors (ASI). These aircraft and simulators are also under regulation by FAR, ICAO, and OMB mandates. State-of-the-art upgrades to flight simulators are critical for the FAA Academy to provide training to ASI's in the latest technological environment to which they are exposed in performing their functions in private industry. Four simulator upgrade projects currently are candidates for funding by this program.

Support. The support program serves as a vehicle for ASI's and appropriate FAA officials to maintain agency-established currency/proficiency standards as pilots-in-command (PIC) and/or second-in-command (SIC) of an aircraft. Aircraft based at Hangar 6 are also used to transport NTSB investigative personnel and equipment to the scenes of major transportation accidents, and are also used to transport Federal Emergency Management Agency personnel to scenes of major natural and other disasters. These aircraft are subject to FAA air safety regulations, agency-sponsored ICAO standards, and OMB mandates.

Aviation Standards Information System (ASIS). This project develops and implements an upgraded FAA national data base that serves all flight programs. The ASIS replaces the Aircraft Management Information System (AMIS) and provides an integrated network to perform the following functions:

- Capture, store, and report operating costs of each individual aircraft to the General Services Administration (GSA)
- Develop advanced mission and maintenance scheduling capabilities
- Track status of aircraft
- Track aircraft parts and their certification as mandated under FAR Part 135.

Products:
- WAAS/LAAS (flight inspection)
- Global positioning system (GPS) navigation receivers
- Ground proximity warning systems (GPWS)
- Digital marker beacon receivers
- Dual high frequency (HF) radios
- Cockpit voice recorders
- GPS flight inspection system (GFIS)
- Flight data recorders
- Engine condition trend monitoring systems
- Flight inspection runway position update systems
- Flight inspection equipment upgrades
- ASIS
- Very high frequency (VHF) radio frequency interference (RFI) canceler equipment
- Centralized flight monitoring and scheduling system (CFMSS)
- FAA Academy simulator upgrades
- Tactical air navigation (TACAN) maintenance simulator equipment.

Accomplishments (1/97–9/98):
- Installed new long-range navigation systems in 15 agency aircraft
- Installed flight inspection GPS's in 12 agency aircraft
- Installed aircraft communications addressing and reporting system in 11 flight inspection aircraft
- Installed cockpit voice recorders in 10 agency flight inspection aircraft
- Installed flight data recorder in one agency flight inspection aircraft
- Installed digital marker beacon systems in 10 agency flight inspection aircraft

- Installed digital distance-measuring equipment in 10 agency flight inspection aircraft

- Installed new tactical air navigation equipment in 10 agency flight inspection aircraft

- Installed flight inspection runway update system in 12 agency aircraft

- Installed controllable oscilloscope system in 15 agency flight inspection aircraft

- Installed updated navigational computer software in 24 agency flight inspection aircraft

- Installed updated flight management systems in 12 agency flight inspection aircraft

- Completed installation of data loader/logger equipment in 18 flight inspection aircraft

- Completed enhanced performance modifications of R&D Beechcraft Model 200 aircraft

- Installed ground proximity warning systems in 20 agency aircraft

- Installed noise-canceling headsets in five flight inspection aircraft

- Installed prototype VHF interference canceller equipment in one flight inspection aircraft.

Sponsor Organizations:

- ATS-1, Air Traffic Services

- ARC-1, Region/Center Operations

- ARA-1, Research and Acquisition

- AVR-1, Regulation and Certification.

Performing Organization:

- AVN-307, Fleet Modernization Staff, Flight Inspection Maintenance Division.

Contractors:

- Trimble Navigation Systems
  Austin, Tex.

- Allied-Signal Corporation
  Olathe, Kans.

- Raytheon Aircraft Corporation
  Wichita, Kans.

- Parker-Hannafin Corporation
  Smithtown, N.Y.

- Sierra Technologies Incorporated
  Buffalo, N.Y.

- American Nucleonics
  Westlake Village, Calif.

- INAIR
  St. Louis, Mo.

Schedule: M12 - Aircraft Related Equipment Program

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS 060 Approved
- Weather Radar Vertical Profile Installed
- Mode S Transponder Installed
- Digital Marker Beacon and Radar Altimeter Contract Award
- VHF Radio Interference Canceller System Contract Award
- BAE-800 HF Radio Installation Complete
- Completed Flight Data Recorder Installation
- Completed Cockpit Voice Recorder Installation
- Completed GPS Flight Inspection Installation
- Completed New TACAN Receiver Installation
- Completed Flight Inspection Runway Position Update System Installation
- Completed Digital Marker Beacon Installation
- Completed Ground Proximity Warning System Installation
- Completed VHF Radio Interference Canceller Installation
- Completed ACARS Installation
- Completed TCAS Installation
- Complete ASIS Installation
- Complete BAE-800 Communication Enhancements

M13–Precision Automated Tracking System (PATS)

Program Description: The William J. Hughes Technical Center uses a precision automated tracking system to test terminal area navigation systems. The existing system is technologically obsolete and is no longer logistically supportable.

This program acquires a replacement for the existing system. The new system is able to track a single target at a range of 25 nautical miles with an accuracy of 10 arc-seconds in azimuth and elevation, and 3 feet in range. It is mobile, permitting testing activities at field locations.

This program has completed the solution implementation phase and transitioned to inservice management.

Products:
- One laser-based precision target tracking system.

Accomplishments (1/97–9/98):
- Completed installation
- Completed acceptance testing.

Sponsor Organization:
- ACT-1, William J. Hughes Technical Center.

Performing Organization:
- ACT-370, Aircraft/Avionics Branch, CNS Engineering and Test Division.

Contractors:
- TRACOR
  Ft. Walton Beach, Fla.

Schedule: M13 - Precision Automated Tracking System (PATS)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS 052 Approved (92–94)
- Contract Award (96)
- Completed Installation (97)
- Completed Acceptance Testing (98–99)
- Program Ends (97)

M15–Spectrum Engineering Management

Program Description: Radio frequency spectrum is a limited national resource that faces continually increasing congestion and competition among its users. This is especially true now that Title VI of the Omnibus Budget Reconciliation Act of 1993 is being implemented. The act requires that 235 megahertz (MHz) of Federal radio frequency spectrum (without exemption for protecting air traffic control services) be transferred to the private sector. Additional spectrum auctions, as a result of the Balanced Budget Act of 1997, has caused additional pressure to be placed on the aeronautical spectrum.

In addition, radio frequency interference (RFI) is a growing problem, particularly near major airports. Careful planning is required to avoid problems with interference, poor propagation, and unavailability of spectrum for particular applications in order to satisfy the strict safety requirements of civil aviation. Frequency interference problems are projected to increase as demands for aviation and nonaviation services grow, especially with the increase of global positioning satellite (GPS) use.

Most of the RFI work is completed at the regional level. More complex problems will be jointly addressed by regional offices in coordination with FAA headquarters.

This program will produce frequency engineering models; RFI suppression devices; investigations of modern technology; procedures for RFI elimination; and radio, television, and pager interference evaluation, etc.

Frequencies supporting communication, navigation, and surveillance systems are engineered to ensure interference-free NAS operation. This effort involves electromagnetic compatibility analysis, formal spectrum certification by the National Telecommunications and Information Administration (NTIA), national and international frequency coordination, radio propagation studies, and spectrum capacity analyses. Additionally, the FAA provides both national and international coordination for aeronautical mobile services, aeronautical fixed services, and aeronautical mobile satellite services in developing International

Civil Aviation Organization (ICAO) standards and recommended practices.

The program will provide support to obtain and protect necessary frequencies for new, relocated, or replaced NAS facilities through automated computer techniques. RFI problems will be investigated and resolved.

The project provides spectrum engineering and frequency management support for projects and facilities that are being implemented under the CIP. Furthermore, the project provides the regions with the training, resources, and equipment (spectrum analyzers and hand-held direction finders) required to independently identify the source of interference problems in a timely manner.

Two new regional-level resources will significantly enhance the region's ability to independently resolve interference problems. First, the equipment necessary to identify and eliminate frequency interference problems will be provided to every regional office. Second, the region's technical support staff personnel will be trained in this area.

Products:

- Frequency plans supporting all CIP projects using the frequency spectrum

- Electromagnetic compatibility guidelines for facility consolidation

- Frequency authorization and formal spectrum approval from the NTIA

- Facility coverage charts

- Spectrum engineering supporting all CIP projects using frequency spectrum

- 11 RFI vans

- 58 hand-held direction-finding devices for regional RFI investigations

- Fixed radio frequency direction-finder network at major airports.

Accomplishments (1/97- 9/98):

- Trained approximately 96 regional and sector personnel on RFI investigation and resolution techniques

- Delivered 13 hand-held direction-finding devices

- Developed automation tools for frequency engineering and RFI investigation/resolution

- Delivered five RFI vans

- Completed frequency assignment data base cleanup in support of next-generation air/ground communications system (NEXCOM) Investment Analysis

- Participate and provide support to ICAO Aeronautical Mobile Communications Panel-5 (AMCP/5) and Frequency Management Study Group

- Participate in International Telecommunications Union- ITU-R WP 8D with the goal of spectrum protection for GPS.

Sponsor Organization:

- AAF-1, Airway Facilities Service.

Performing Organization:

- ASR-1, Office of Spectrum Policy and Management.

Contractors:

- Volpe National Transportation Systems Center Cambridge, Mass.

- MITRE McLean, Va.

- LB&M Arlington, Va.

Schedule: M15 - Spectrum Engineering Management

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
								Continuing Support											→

- Begin Free Flight Spectrum Requirement Studies
- Delivered Automated Spectrum Monitoring Systems
- Completed Prototype RFI Direction-Finder Network
- Completed HF Data Link MOPS/MASPS Development
- Completed GPS Spectrum Studies
- Completed HF Data Link SARP Development
- Completed RFI Van Delivery
- Complete TDMA VHF Radio Studies
- Complete Free Flight Spectrum Requirement Studies

M17–Test Equipment Modernization and Replacement

Program Description: Test equipment must be technologically compatible with the NAS systems being maintained. The test equipment used in field repair, diagnostics, and system certification is based on 25-year-old technology, is unreliable and difficult to repair and calibrate, does not maintain tolerances when transported, and is no longer supported by the FAA Logistics Center.

This program acquires new test equipment. The acquisition approach for purchasing test equipment is to make maximum use of existing large-scale Government procurement programs that provide cost and schedule benefits to the FAA, such as DOD consolidated equipment lists and GSA schedules.

Beginning in FY 2000, this program also funds automated test equipment (ATE) for use at the FAA Logistics Center. The technology required for component diagnostics, testing, and quality control for NAS systems has advanced beyond the capability of current ATE.

Products:
- Upgraded test equipment
- Test equipment repair and calibration
- Multifunction test equipment
- Test equipment that supports the Maintenance Control Center concept.

Accomplishments (1/97–9/98):
- Acquired 26 Communication Test Sets
- Acquired 16 Signal Generators
- Acquired 12 Frequency Counters
- Acquired 57 Telephone Test Sets.

Sponsor Organization:
- AAF-1, Airway Facilities Service.

Performing Organization:
- AML-1, FAA Logistics Center.

Contractors:
- Various vendors.

Schedule: M17 - Test Equipment Modernization and Replacement

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
								Continuing Effort											→

M18–Computer Resources Nucleus (CORN)

Program Description: The program installed a standard computing platform to resolve multiple hardware and software platform inconsistencies. It provided a contract vehicle for purchasing computing services.

Products:
- Contract vehicle to obtain computing services.

Accomplishments (1/97–9/98):

- Closed out the CORN contract and replaced it with the Integrated Computing Environment—Mainframe and Networking (ICE-MAN) contract. Through ICE-MAN, the agency will receive mainframe computer services from the U.S. Department of Agriculture on a fee for service basis.

Sponsor Organization:

- AIT-1, Information Technology.

Performing Organization:

- AIT-400, Information Technology Acquisitions, Information Technology.

Contractors:

- Electronic Data Systems (EDS)
  Plano, Tex.

Schedule: M18 - Computer Resources Nucleus (CORN)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• Contract Award					• Contract Ended													

M20–NAS Training Modernization

Program Description: The FAA has unique technical training requirements due to the specialized nature of the NAS. The FAA Academy conducts technical training for air traffic controllers, airway facilities technicians, inspectors, and other specialists, and is responsible for internal training infrastructure. Training on the new systems being installed as the result of NAS modernization requires updated simulators, training media, and communications equipment. The FAA Academy's classrooms, laboratories, and staff work areas are outdated and need to be modernized. Much of the laboratory equipment is inadequate and has exceeded its expected service life.

This program procures and installs training equipment, simulators, automated training development systems, interactive training equipment, and communications equipment supporting resident and field-based students. It also retrofits FAA Academy classrooms, laboratories, and staff work areas.

Automated systems to support training include the Instructional Resource Information System (IRIS) and the FAA Instructional Superhighway for Training (FIST).

Products:

- High- and medium-fidelity simulation training systems
- Interactive instruction delivery systems (IIDS)
- Classroom, training laboratory, and instructor area upgrades.

Accomplishments (1/97–9/98):

- Completed 15 additional Airway Facilities (AF) advanced technology classrooms and installation of 5 audiovisual systems in Air Traffic classrooms
- Completed Phase 1 of the Instructional Resource Information System (IRIS)
- Deployed FAA Instructional Superhighway for Training (FIST)
- Upgraded NAS operations manager simulator
- Developed and equipped the FAA Academy's Communication Equipment lab (Course 47504)
- Expanded Air Traffic (AT) multimedia classrooms to include advanced training
- Launched classroom-based Intranet and voice-over Intranet Protocol Prototypes
- Enhanced IIDS classroom and developer networks
- Updated 42 AT developer and 103 controller headsets.

Sponsor Organization:

- ARC-1, Region/Center Operations.

Performing Organizations:

- AMA-100, Operational Support Division, FAA Academy
- AMA-400, Airway Facilities Division, FAA Academy
- AMA-500, Air Traffic Division, FAA Academy.

Contractors:
- UNICOR
  Texarkana, Ark.
- Gateway 2000
  North Sioux City, S.D.
- Hewlett Packard
  Dallas, Tex.
- Graphic Resource Center
  Oklahoma City, Okla.
- Oracle Corporation
  Belmont, Calif.
- TRV Communications
  Oklahoma City, Okla.
- Cory's Audiovisual
  Oklahoma City, Okla.
- Micron Electronics
  Nampa, Idaho
- Electrohome, Inc.
  Rancho Cucamonga, Calif.
- Marvel
  Chicago, Ill.

Schedule: M20 - NAS Training Modernization

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

Classroom Upgrades
- Complete Air Traffic Upgrade - Phase 1
- Complete Non-AT/AF Upgrade
- Complete Air Traffic Upgrade - Phase 2
- Complete AF Initial Upgrade

Instructor/Staff Work Area Upgrade
- Completed Air Traffic Upgrade - Phase 1
- Complete Air Traffic Upgrade - Phase 2
- Complete AF Initial Upgrade

Laboratory Upgrades
- Completed Air Traffic Upgrade - Phase 1
- Complete Air Traffic Upgrade - Phase 2
- Complete AF Initial Upgrade

Sustainment of Capabilities

M21–Asset Supply Chain Management

Program Description: The Logistics Support System and Facilities (LSSF) and the National Bar Coding project have become integrated into a 21st century logistic support capability known in private industry as Asset Supply Chain Management (ASCM). CIP implementation directly affects the FAA Logistics Center's (FAALC) ability to provide logistics support to sustain legacy and newly acquired commercial-off-the-shelf (COTS) systems for NAS operations.

This project modernizes support equipment and automated materiel management systems directly required for NAS project deployment life-cycle support and extends life-cycle support capabilities of obsolete NAS systems well beyond their planned decommissioning schedule.

The Air Traffic Service (ATS) organization is implementing a bar code asset tracking system (BCATS) that tracks critical assets essential to NAS efficiency. Sound logistics asset tracking and management are critical to providing the "right part to the right location" to maintain availability of operational equipment and service.

ATS's Airway Facilities (AF) has developed an agency bar code specification to assist the acquisition community in standardizing the use of bar code technology within the FAA community. Using an industry bar code standard, automatic data collection technology, electronic commerce, and an inventory management analysis system will allow AF and the FAALC to begin modernizing the logistics support structure for NAS operations. The FAALC will continue to automate the warehouse through integration

of AF bar code standards. This integration will enable the FAALC to ensure perpetual inventories, process orders for parts using a "seamless requisitioning" system, monitor assets through their life cycles (i.e., "cradle to grave"), and provide for complete cost and performance analysis of logistics operational support.

In FY 2000, the ASCM capability will begin integrating the LSSF and National Bar Coding Project by establishing the Core ASCM architecture and integration effort; initiating network servers and support platforms; configuring an identification data base; and developing an asset tracking system.

Products:

- Modern systems for management, control, and handling of assets
- Materiel-handling equipment and system upgrades
- Unique test equipment for depot-level repair
- Replacement of the mobile facilities fleet
- Adequate spare parts and upgraded unique equipment.

Accomplishments (1/97–9/98):

- Completed review and update of LIS functions for year 2000
- Provided support to agency programs: NAS Infrastructure Management System (NIMS), Bar Coding and Tracking System (BCATS), Cost and Performance, Acquire, and cost data to IPT's
- Updated security processes and supported transfer from the Computer Resources Nucleus (CORN) platform to Integrated Computed Environment—Mainframe and Networking (ICE-MAN)
- Updated cost center codes
- Changed LIS/Departmental Accounting and Financial Information System (DAFIS) interface processes to allow inventory balances to agree

- Completed bar coding and data harvesting for 10 NAS radar installations
- Completed BCATS Management Plan with the contractors
- Generated agency bar-coding requirements for new system acquisition in a contract Contract Data Requirements List (CDRL)/Data Item Description (DID) format for Standard Terminal Automation Replacement System (STARS), Host Oceanic Computer System Replacement (HOCSR), and Beacon Interrogator-6 (BI-6)
- Defined application model and concept for Version 1.0 Asset Tracking Module for the personal and hand-held computer
- Accomplished IOC of a seamless requisition at the Airport Surveillance Radar, Model 9 (ASR-9) Nantucket, ASR-9 Boston Logan, and the Airport Surface Detection Equipment, Model 3 (ASDE-3) Boston Logan
- Purchased Teradyne automatic test equipment
- Changed pricing, excess, and cycle inventory processes to meet Office of Inspector General (OIG) audit requirements
- Developed Total Transaction Tracking System to enhance the materiel-handling processes
- Enhanced LIS Automated Procurement System to allow more efficient process with the new Acquire system
- Established BCATS Beta Server System in Plymouth, Mass.

Sponsor Organization:

- AAF-1, Airway Facilities Service.

Performing Organization:

- AML-1, FAA Logistics Center.

Contractors:

- Modern Technology Systems
  Oklahoma City, Okla.

Schedule: M21 - Asset Supply Chain Management

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

Materiel-Handing Equipment Upgrade/Modification

Logistics and Inventory System Computerized Dispatch System (LIS/CDS)

Mobil Facilities Fleet

Asset Management Architecture and Integration

• MNS 325 Approved

• Investment Analysis Decision

• ASCM Core Architecture/Infrastructure

• Inventory Management and Accounting

• Performance—Technical and Functionality

• Legacy NAS Systems Bar coding

• Legacy NAS Systems Bar coding

• Asset Management— Capitalized Assets

M22–NAS Implementation Support

Program Description: The NAS Implementation Support Contract (NISC) is the vehicle the FAA uses to economically purchase the skilled labor hours necessary to plan, coordinate, integrate, implement, and test NAS modernization projects at field facilities. NISC personnel provide a range of direct project support to FAA Headquarters, the Aeronautical Center, Regional Offices, and to major FAA facilities. A key element of the NISC approach is synthesizing cross platform integration that embraces a holistic view of the NAS.

This program awarded NISC II, a 10-year performance-based contract that supplies highly qualified planners, engineers, technicians, safety experts, and analysts to augment the FAA workforce. The NISC II contract has one of the lowest labor rates of any contract in the agency, and is the most cost-effective and timely method available to address the acute need for infrastructure modernization. This support is furnished directly to the Airway Facilities and Air Traffic organizations at regional offices, field facilities, and FAA Headquarters.

Products (Partial Listing):

• Air route traffic control center and airport traffic control tower transition plans

• Major facility configuration control

• Supplemental regional project management

• Facility installation/implementation schedule planning and coordination

• Transition strategy assessments and recommendations

• Facility test plans and operating procedures

• System inservice readiness reviews

• Studies and analyses of radio frequency spectrum requirements and allocations

• Maintenance requirements and procedures documentation for new automation, communications, and navigation/landing systems

• Integrated Logistics Support Plans for new systems

• Environmental planning and assessments.

Accomplishments (Selected 1997):

• Supported transition planning and engineering for Northern California Terminal Radar Approach Control (TRACON)

• Supported installation and commissioning for Air Route Traffic Control Center (ARTCC) Voice Switching and Control System (VSCS)

• Supported development and installation of Automated Flight Data Processing System (AFDPS) software at Chicago O'Hare Airport Traffic Control Tower (ATCT)/TRACON

- Supported development and coordination of Project Implementation Plans (PIP) and Generic Site Implementation Plan (GSIP), product smart-sheets, and issue status reports for key programs such as VSCS, Display System Replacement (DSR), Standard Terminal Automation Replacement System (STARS), Airport Movement Area Safety System (AMASS), Weather and Radar Processor (WARP), Host Interface Device/NAS Local Area Network (HID/NAS LAN)
- Supported preparation of major acquisition documentation to support decisions on Potomac and Northern California TRACON's, New Austin Airport, and NAS Infrastructure Management System (NIMS)
- Supported preparation of operational support-ability analyses for the Direct Access Radar Channel (DARC), Oceanic Plan View Display (PVD), Air Route Surveillance Radar, Models 1 and 2 (ARSR-1/2), TRACON Automated Radar Terminal System IIIA (ARTS IIIA) and Air Traffic Control Beacon Interrogator (ATCBI) systems.

Sponsor Organization:
- AAF-1, Airway Facilities Service.

Performing Organization:
- ANS-100, NAS Planning and Support Division, NAS Transition and Integration.

Contractors:
- Lockheed Martin Corporation
  Bethesda, Md.
- Arthur D. Little Inc.
  Cambridge, Mass.
- Automated Information Management, Inc.
  Lanham, Md.
- Information Spectrum, Inc.
  Falls Church, Va.
- Advancia Corporation
  Lawton, Okla.
- Science Applications International Corporation
  San Diego, Calif.
- TRW Inc.
  Cleveland, Ohio.

Schedule: M22 - NAS Implementation Support

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS Approval (Waivered)
- Base Contract Award
- Base Contract Ends
- Option Period Ends

NISC II
- Begin Requirements Validation
- NISC II Contract Award
- NISC II Transition
- NISC Program Acquisition Review
- NISC II Base Period End

M24–National Aviation Safety Data Analysis Center (NASDAC)

Program Description: The FAA's ability to access and analyze safety data has been limited by lack of standardization, data integrity problems, and dispersed data source systems. These limitations have made analyzing safety data time consuming and labor intensive.

The NASDAC program provides a modern, automated capability for analyzing safety data. The NAS-DAC imports data from Government and non-Government sources, normalizes and standardizes the data, and provides access and analysis through a set of common safety analysis tools. Growth in demand for safety data has resulted in the NASDAC processing more than 10 times the number of requests for study data originally envisioned.

Products:

- Safety analysis center

- Computer hardware and software infrastructure

- Online access throughout FAA

- Public access to selected data and tools

- Safety reports and analyses.

Accomplishments (1/97–9/98):

- Expanded access to NASDAC, including a site for the public, an internal FAA site for the intraweb, and a site for other non-FAA Government use

- Completed the expansion of NASDAC access to all FAA Headquarters program offices and selected regional offices

- Implemented a data warehousing strategy with data-mining tools.

Sponsor Organization:

- ASY-1, System Safety.

Performing Organization:

- ASY-100, Safety Data Services Division, System Safety.

Contractors:

- MacFadden & Associates
  Silver Spring, Md.

Schedule: M24 - National Aviation Safety Data Analysis Center (NASDAC)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS 032 Approved
- Contract Award
- Commissioned FAA Headquarters Facility
- Completed Online Services for FAA Personnel
- Finalize Hardware/Software Network Architecture
- Complete Public Access
- Complete Engineering Support
- Migrate NASDAC Services to FAA Lines of Business
- Complete Engineering Support

M25–Independent Operational Test and Evaluation (IOT&E)

Program Description: The program provides an independent assessment of the operational effectiveness and suitability of designated systems. Using critical operational issues (COI) defined by users as the foundation for evaluation criteria, the Air Traffic Services Test Team (ATS TT) monitors system development to identify potential operational risks and communicates them to the independent product teams (IPT). When Research and Acquisition (ARA)-sponsored system test activities are completed, the ATS TT conducts an independent operational assessment of the new system in its actual operational environment. The results of this assessment are used to support the inservice decision for national deployment of the system and its transition into the inservice management phase. The Associate Administrator for ATS designates systems to undergo IOT&E based on factors such as system complexity, life-cycle cost, operational criticality, and risks.

Products:

- Issue papers

- Early operational assessments

- IOT&E plans and procedures

- IOT&E reports

- IOT&E followup reports.

Accomplishments (1/97–9/98):

- Completed common ARTS IOT&E report

- Completed ETVS IOT&E report

- Completed HID/NAS LAN IOT&E report.

Sponsor Organization:

- ATS-1, Air Traffic Services.

Performing Organization:

- ATQ-1, Office of Independent Operational Test and Evaluation.

Contractors:

- Technautics Incorporated
  Falls Church, Va.

- Galaxy Scientific Corporation
  Pleasantville, N.J.

Schedule: M25 - Independent Operational Test and Evaluation (IOT&E)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- Completed Mode S IOT&E Report
- Completed TACAN Antenna IOT&E
- Completed VSCS IOT&E Report
- Completed ASR-4 IOT&E Report
- Completed DCCR IOT&E Report
- Completed C-ARTS IOT&E Report
- Complete HID/NAS LAN IOT&E Report
- Completed ETVS IOT&E Report
- Completed DSR IOT&E Report
- Completed VTABS IOT&E Report
- Complete AMASS IOT&E Report
- Complete HOCSR IOT&E Report
- Complete OASIS IOT&E Report
- Complete Oceanic IOT&E Report
- Complete STARS IOT&E Report
- Complete WARP IOT&E Report
- Complete ASR-11 IOT&E Report
- Complete NIMS IOT&E Report
- Complete TMA IOT&E Report
- Complete pFAST IOT&E Report
- Complete URET IOT&E Report
- Complete CPDLC IOT&E Report
- Complete CPDLC IOT&E Report
- Complete EDARC IOT&E Report

M26–NAS Management Automation Program (NASMAP)

Program Description: Many NAS data systems use proprietary architectures; they were not designed to interconnect and do not have a common interface. The ability to share data among systems is nonexistent or extremely limited. As a result, they are unable to meet the demand of FAA program offices for timely, accurate information, despite the fact that most of the information exists.

This program implements a Corporate Information Management System and National Data Warehouse. The program consists of three components: an integrated hardware and software architecture plan; the hardware and software required to support the architecture; and an Executive Information System.

Phase 1 is complete; it built the infrastructure and communications capability. Phase 2 is the Corporate Information Management System (CIMS). The ar-

chitecture is complete, and implementation has begun. Components under development are:

- An electronic dictionary that stores definitions/metrics/sources

- An Air Traffic Services National Data Warehouse that stores mission-critical data from legacy systems

- A NAS Support Integration Process that annually reviews all NAS support systems for integration with the CIMS architecture, cost savings, mission value, and funding

- A Regional Information System that will gather and distribute data and support field daily operations

- An Executive Information System that will extract information for executive decision support.

Products:

- Baseline architecture plan
- Hardware and software
- Software data interface
- Executive Information System
- Electronic National Data Warehouse
- Electronic Data Dictionary
- Proof of Concept Regional Information System.

Accomplishments (1/97–9/98):

- Established NAS Support Operations Center (NSOC)
- Developed NAS Support Integration Process
- Deployed Phase 1 of the Regional Information System
- Expanded access to the Executive Information System to all Air Traffic Service executives.

Sponsor Organization:

- ATS-1, Air Traffic Services.

Performing Organization:

- AAF-60, Air Traffic Service Information Management Services.

Contractors:

- Titan Corporation
  Reston, Va.

Schedule: M26 - NAS Management Automation Program (NASMAP)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS 125 Approved

Infrastructure
- Phase 1 Completed

Corporate Information Management System (CIMS)
- Phase 2 Contract Award
- Released Data Dictionary/Warehouse Version 1
- Begin Implementation
- Complete Regional Information System
- Complete CIMS Implementation

M27–National Airspace Integrated Logistics Support (NAILS)

Program Description: The FAA completed an automated decision support capability to identify supportability requirements, develop long-range life-cycle cost estimates by system, and conduct performance-based tradeoff analyses. This program established, maintained, and enhanced the agency's ability to effectively manage NAS supportability and minimize life-cycle costs associated with NAS acquisition and maintenance. This program has completed the solution implementation phase and is in the inservice management phase of its life cycle.

Products:

- Requirements information management system
- Requirements information management system acquisition document automation
- Budget requirements tool
- Cost and performance measurement system
- Level of repair analyses model enhancement
- Spares planning model enhancement
- Logistics data storage and retrieval system
- Life-cycle management cost model
- Logistics management information and project tracking.

Accomplishments (1/97–9/98):

- Transferred NAILS program to Inservice Management.

Sponsor Organization:

- AAF-1, Airway Facilities Service.

Performing Organization:

- AAF-1, Airways Facilities Service.

Contractors:

- MacFadden & Associates
  Silver Spring, Md.

Schedule: M27 - National Airspace Integrated Logistics Support (NAILS)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
					• Implemented Requirements Information Management System Phase 2 • Completed Cost and Performance Measurement System Prototype • Completed Initial Performance-Based Budget Forecast Tool

M28–FAA Corporate Systems Architecture

Program Description: To meet its critical mission, the FAA acquires, develops, certifies, and maintains high-quality, predictable, and affordable software, on a timely basis. The FAA also requires that software installed and operated in safety-critical applications be architected and certified to meet required levels of integrity, reliability, availability, and security. This means that sound software engineering practices must be followed in purchasing, developing, architecting, certifying, and maintaining software-intensive systems. The FAA lacks an efficient, institutionalized process to acquire, integrate, and maintain the infrastructure needed to satisfy its primary objective.

The program establishes and maintains an agency-wide system blueprint that serves as the framework for planning, developing, and maintaining corporate data processing, information, and communications systems. The program concentrates on four distinct projects: software engineering process improvements; technology and architecture; data management, access, and information technology security; and the software engineering resource center.

Software Engineering Process Improvements. The project focuses on improving the software maturity level of FAA organizations and major system suppliers by providing training, establishing standards for documentation, developing competencies, and applying the FAA integrated Capability Maturity Model (iCMM) and appraisal methods. This is needed to ensure that decisionmakers purchase, develop, certify, and maintain software that is of a high quality, predictable, affordable, and delivered on time.

Many of the FAA's software problems are related to immature processes that are used to acquire, develop, and maintain software. Both the FAA and its suppliers experience these process-related problems. This program will apply the iCMM developed by the Software Engineering Institute and the NAS Enterprise Architecture process and methods to measure and to guide software improvements and to build the next-generation NAS.

Technology and Architecture. The project develops standards and implements an infrastructure to guide government, industry, and FAA in purchasing, developing, and certifying software-intensive systems. The corporate architecture will permit applications to run on a variety of hardware platforms as well as minimize the cost of incorporating new software and hardware standards. Meeting the standards will ensure seamless integration and facilitate information exchange among various systems.

A key task is the operation of the FAA Enterprise Network that ensures that the network of routers, servers, hubs, and cabling that connect the various networks and systems at FAA Headquarters, regions, and centers are operating properly. Without the routers, servers, hubs, and cabling, FAA Headquarters, regions, and centers would not be able to communicate with each other via electronic mail, intranet, Internet, and the Web.

Data Management, Access, and Information Technology Security. The project provides the technologies to ensure that FAA decisionmakers have secure access to information, people, and organizations necessary to carry out the FAA's critical mission. Secure electronic data interchange will focus on encrypted electronic mail systems that will scramble reception by unauthorized users similar to the way that nonpaying entities are prevented from accessing cable programming. Effort in this area will ensure that unauthorized users and hackers will not gain access to vital FAA information.

Software Engineering Resource Center. This project will improve NAS and avionics safety and reduce NAS and avionics acquisition development, and maintenance costs by developing and implementing improved processes and procedures for the safe use of software within the NAS and avionics. This will directly benefit all elements of air transportation, including passengers.

The FAA Software Engineering Resource Center (the Center), to be established by the end of FY 1999, will

be a focal point for research on FAA software-intensive systems. Through the use of interdisciplinary teams, which need not be co-located, the Center will leverage government, academic, and industry resources. The Center will be an FAA-wide resource to address strategic software technology problems that affect mission performance and enhance FAA in-house software/systems engineering competencies. The primary facilities for the Center have been established at the FAA William J. Hughes Technical Center and at FAA headquarters. Remote tie-ins with other facilities are also planned (e.g., at other research sites such as NASA and the EUROCONTROL Experimental Center). This project supports Recommendation R-14 of the *Report of the Challenge 2000 Subcommittee of the FAA R,E&D Advisory Committee for the Administrator, Action Plan 5: Validation and Certification Methodology* of the FAA EUROCONTROL R&D Committee agreements, and Section 4 of the *Subcommittee Report of the NAS ATM R&D Panel to R,E&D Advisory Committee.*

The specific focus and outcomes of the Center are:

- NAS Architecture Research

  – Evaluation and prototyping of high-integrity, safety-critical architectures to find better and cheaper ways of assuring high integrity in safety-critical architecture design that jointly address hardware and software in systems, potentially eliminating a need for independent certification of the software

  – Architecture definition and description to investigate unified approaches to formal architecture definition and description for cost-effective evaluation and comparison of competing candidate architectures

  – Analytical and simulation architecture models for the NAS to investigate the effect of various constraints on NAS operational concepts and optimization of constraints—including cost and performance—prior to committing resources to system implementation and deployment.

- Research on applying commercial-off-the-shelf/nondevelopmental item (COTS/NDI) software within the NAS ground systems and avionics

  – COTS/NDI software assurance to investigate conditions under which a COTS software product can be certified to a given level of safety, as defined by current standards; establish selection criteria and evaluation guideline for ongoing work in information security product evaluation and a number of other related areas, such as NAS Infrastructure; identify and evaluate techniques for reducing the cost and time needed to ensure COTS/NDI software and systems containing it are safe and function as required

  – Evaluation and prototyping of system and software engineering processes and methods for use in COTS-intensive systems to identify and evaluate more effective practices for use in software requirements definition, software/systems analysis and design and testing that are appropriate for safety-related systems using COTS/NDI software; investigation of different methodologies to quantify, characterize, and guard against the risk of unexpected activation of unplanned-for COTS functionality for a given system and environment

  – Software estimation models for COTS-intensive systems to investigate better ways of estimating and predicting life-cycle costs of COTS-intensive systems—including consideration of complex interactions of major cost and schedule drivers that relate to evaluation, interfacing, integration, product refresh, and maintenance of COTS software.

- Software Certification Research

  – Processes for certification of the software aspects of safety-critical airborne and ground-based systems within the NAS to explore promising techniques for streamlining the certification process without affecting levels of safety

  – Processes for ensuring end-to-end safety and certification of integrated air/ground systems; investigate and validate different approaches for performing end-to-end safety assessments and certification of integration of air/ground systems in the NAS, as the current practice of separately certifying the airborne and ground components of the NAS, which is becoming more integrated through the introduction of new services such as data link.

Products:

- Application of FAA iCMM and appraisal methods

- NAS Enterprise Architecture process and methods
- Software engineering competencies assessment and training
- Streamlining software aspects of certification
- FAA Enterprise Network Operations Center
- Computer/communication network facilities
- FAA standards for data documentation
- Secure electronic data interchange implementation plan.

Software Engineering Research Center

NAS Architecture Research

- Guidelines and standards for defining, representing, and designing high-integrity architectures for the NAS
- Executable and reusable architecture model that can be extended or tailored to support domain-specific engineering and product acquisitions for the NAS.

Research on Applying COTS/NDI

- Evaluation criteria and guidelines for COTS software proposed for use in safety-related aviation systems.

Software Certification Research

- Guidelines and processes for improved certification of avionics and ground systems; specific recommendations to the appropriate RTCA committees that develop standards and guidelines for certifying avionics systems.

Accomplishments (1/97–9/98):

- Completed development of FAA iCMM
- Initiated Software Engineering Resource Center
- Defined executive-level metrics
- Provided process improvement training
- Completed Host Baseline Data and Functional Models
- Provided Internet FIREWALL upgrade
- Implemented private TCP/IP (secure data transmission)
- Continued upgrades to existing infrastructure.

Sponsor Organizations:

- ARA-1, Research and Acquisition
- AVR-1, Regulation and Certification
- ATS-1, Air Traffic Services
- AIT-1, Information Technology.

Performing Organization:

- AIT-5, Chief Scientist for Software Engineering
- AIT-300, IPT for Information Technology Services.

Contractors:

- Volpe National Transportation Systems Center
  Cambridge, Mass.
- Software Engineering Institute
  Pittsburgh, Pa.
- TRW Inc.
  Fairlakes, Va.
- KENROB
  Leesburg, Va.

Schedule: M28 - FAA Corporate Systems Architecture

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS 041 Approved
- Electronic Commerce and Data Pilot Project Completed

Technology and Architecture
- Begin Implementation
- Completed Implementation

Data Management, Access, and Information Technology Security
- Begin Implementation
- Complete Implementation

Software Engineering
- Begin Implementation
- Complete Implementation

Software Engineering Resource Center
- Establish/Maintain Infrastructure
- Develop/Implement Operational Plans and Methodology
- Establish/Maintain Working Relationships With Other Centers
- Establish/Maintain Working Relationships With Contract Researchers

NAS Architecture Research
- Evaluation
- – Develop an Architecture Decision Tree
- – Prototype the Architecture Decision Tree
- Definition and Representation
- – Develop Guidelines for "Good" Definition
- – Develop Guidelines for "Good" Representation
- Analytical and Simulated Models of NAS Architecture
- – Develop, Test, and Evaluate Analytical Representation
- – Develop, Test, and Evaluate NAS Simulations

Research on Safe and Effective Application of COTS/NDI in the NAS
- Standards and Guidelines: COTS/NDI Software/System Assurance
- Standards and Guidelines: COTS/NDI Software/System Methods
- Standards and Guidelines: COTS/NDI Software/System Cost Estimatic

Software Certification Research
- Standards and Standards and Guidelines for Certification of Safety-Critical Software-Intensive Systems: COTS/NDI Software/System Cost Estimation
- Standards and Standards and Guidelines for End-to-End Test of Air/Ground Software-Intensive Systems: COTS/NDI Software/System Cost Estimation

M29–Air Traffic Operational Management System (ATOMS) Local Area Network/Wide Area Network

Program Description: FAA Headquarters and field facility personnel need real-time information about air traffic operations in order to manage the air traffic system. Air traffic operational data are collected by field facilities and transmitted to FAA Headquarters for analysis and storage. Data collected are also required for Congressionally mandated reports and for FAA, DOT, and other Government agencies preparing statistics on air traffic activity and delays. Data collection is done manually, and transmission relies on the use of dial-up circuits. Field facilities do not have access to the information after it is transmitted, nor do they have the capability to archive it for later analysis.

This program will create, install, enhance, and oversee operation of an air traffic management system that uses a large-scale national telecommunications network. This network will use application software

to collect and disseminate information that is critical to operations at all air traffic control facilities and to measuring national airspace performance.

ATOMS provides, operates, and supports the network applications that track the number of air traffic operations and delays occurring within the air traffic system. This is used for planning tracking, and evaluating air traffic performance.

Another critical component is implementing systems that collect data used for scheduling, overtime, staffing, training, and other personnel-related activities. This function will be accomplished by distributing a software package to all air traffic field facilities.

ATOMS includes 28 local area networks in FAA Headquarters. The project installed and supports local area networks in 20 air route traffic control centers. Future plans include installing local area networks in centers in Hawaii and Alaska, and a wide area network to connect approximately 630 field sites doing operational data collection and analysis.

The program acquires information technology tools, which simplify and facilitate collection and analysis of air traffic operational data. It also implements a data warehouse that can be accessed by field and headquarters personnel.

Products:
- Wide area network hardware and software
- Hardware, software, and telecommunications upgrades.

Accomplishments (1/97–9/98):
- Upgraded collection software to meet requirements for more timely and expanded data on delays
- Began developing enhanced activity data collection capability at level 3 and 4 terminals.

Sponsor Organization:
- ARS-1, Air Traffic System Requirements Service.

Performing Organization:
- ATX-400, Planning, Information and Analysis.

Contractors:
- SYNETICSS
  Vienna, Va.

Schedule: M29 - Air Traffic Operational Management System (ATOMS) LAN/WAN

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

- MNS 103 Approved
- Hardware Purchased for Regions/Level V Towers
- Completed Hardware Installation
- Completed Network Training
- Expand Data Collection Capability
- Enhance/Replace Computer Hardware
- Enhance/Replace Telecommunications Hardware
- Complete Data Warehouse Performance Data Upgrade
- **Continuing Support** →

M31–NAS Information Security System (NISS)

Program Description: As the NAS migrates to an open system architecture, NAS information will become more vulnerable to tampering or malicious destruction. NAS safety must be maintained, and the FAA must comply with Federal statutes and policies that require protection of information.

This program implements a life-cycle approach for NAS information security. In addition to developing information security requirements, the program performs a comprehensive vulnerability analysis; surveys commercially available countermeasures; implements a security engineering process; develops a concept for security management; and updates the FAA's information security policy.

This program concentrates on three areas:

NAS Architecture and Engineering. This project supports definition of NAS-wide information security (INFOSEC) services as part of the NAS Architecture. The work involves formulation of INFOSEC standards, requirements, policies, and guidelines for NAS systems, including coordination with industry

as required. Engineering support involves product assessments, testing, conducting vulnerability assessments, and delivery of expert INFOSEC engineering assistance to integrated product teams (IPT). This work also supports NAS INFOSEC investment analysis.

Integrated Product Team INFOSEC Engineering. This project supports IPT INFOSEC services of common concern and for individual systems. The work includes INFOSEC engineering services for system requirements, design, development, test, vulnerability analyses, and INFOSEC certification. The work also includes INFOSEC hardware and software acquisitions to meet systems requirements. NAS automation, communications, navigation, and surveillance systems benefit from this protection.

INFOSEC Policy Compliance. This project enhances the FAA's INFOSEC capabilities in policy compliance, including review and approval of INFOSEC plans for individual NAS systems. It includes risk assessments and assurance monitoring of systems under assessment and those systems in the formal certification process. This project also develops an incident collection and reporting capability for the NAS.

Products:
- NAS security architecture
- NAS security engineering process
- NAS security concept of operations
- NAS security profiles
- NAS security test and evaluation
- IPT security engineering support.

Accomplishments (1/97–9/98):
- Obtained approval of Mission Need Statement (MNS) 324
- Established NAS Information Security System (NISS) Group
- Provided information security considerations into NAS Architecture 1998.

Sponsor Organizations:
- ACS-1, Civil Aviation Security
- ARA-1, Research and Acquisition.

Performing Organizations:
- ASD-110, NAS Architecture
- ACO-700, Information System Security.

Contractors:
- CygnaCom
  McLean, Va.
- TASC
  Herndon, Va.
- TROY Systems
  Fairfax, Va.

Schedule: M31 - NAS Information Security System (NISS)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
						• MNS 324 Approved • NAS Threat Assessment • Detailed NAS INFOSEC Operations Concept • Security Architecture Definition • Complete Investment Analysis													

M33–Advanced Airport Security Systems

Program Description: Of the world's top 20 busiest airports, 14 are located in the United States. Including international traffic, systemwide U.S. air carrier enplanements are forecast to grow to 800 million by 2000. Stringent security measures have been in place for international flights for many years. Since the spring of 1995, the aviation system within the United States has been on alert—and increased security requirements remain in place at U.S. airports—and security measures overseas have been increased and adjusted a number of times.

In October 1996, the FAA formed the Security Equipment Integrated Product Team (SEIPT) of acquisition and security experts to plan, purchase, and install explosives detection devices and other advanced security equipment at U.S. airports. In addition, the team includes members from many of the airlines that will ultimately operate and maintain this

equipment, as well as airport authority representatives. Its objective is to implement the White House Commission on Aviation Safety and Security recommendations to purchase and install advanced security equipment for use by air carriers at major domestic airports.

The first phase of a multiyear program to deploy advanced security equipment to U.S. airports is already underway using funding provided by the Omnibus Consolidated Appropriations Act of 1997. Fifty-four FAA-certified explosives detection systems were installed at U.S. airports by September 1998. The SEIPT also installed over 480 trace explosives detection devices, 20 automated x-ray devices, and 2 quadrupole resonance detection devices at 79 U.S. airports by September 1998. Further, in cooperation with U.S. airlines, the SEIPT will complete deployment of a Computer Assisted Passenger Screening (CAPS) system, Screener Proficiency Evaluation and Reporting System (SPEARS) computer-based training (CBT), and x-ray threat image projection equipment. In FY 1999, the SEIPT will deploy 88 FAA-certified explosive detection systems, 75 trace detection devices for screening checked baggage, 10 trace detection passenger screening portals, 40 trace detection document scanners, and 85 automated checkpoints.

Products:

- FAA-certified explosives detection systems for screening checked baggage

- Advanced Technology dual energy automated x-ray and quadrupole resonance devices for screening checked baggage

- Trace Explosives Detectors for carry-on baggage screening

- Adaptation of the Northwest Airlines-developed CAPS

- SPEARS technology for testing screeners.

Accomplishments (1/97–9/98):

- Installed nine fully operational explosives detections systems

- Deployed 50 trace detection devices

- Completed Northwest Airlines development of CAPS

- Initiated technology transfer of CAPS to other carriers

- Established standard trace systemwide training

- Deployed 17 of 19 SPEARS CBT systems for x-ray screeners.

Sponsor Organizations:

- ACS-1, Civil Aviation Security

- ARA-1, Research and Acquisition.

Performing Organization:

- AAR-600, IPT for Security Equipment

Contractors:

- Invision Technologies
  Newark, Calif.

- Barringer Instruments
  New Providence, N.J.

- Thermedics Detection, Inc.
  Chelmsford, Mass.

- Ion Track Instruments
  Wilmington, Mass.

- JGW International
  Fairfax, Va.

- Raytheon Services, Co.
  Burlington, Mass.

- Lockheed Martin
  Springfield, Va.

- JIL Information Systems
  Vienna, Va.

- PRC, Inc.
  McLean, Va.

- Vivid Technologies
  Woburn, Mass.

- Intelligent Detection Systems (IDS)
  (formerly CPAD Technologies Inc.)
  Ottawa, Ont. Canada

- EG&G Astrophysics Research Corp.
  Long Beach, Calif.

- Heimann Systems Division
  Iselin, N.J.

- Volpe Center
  Cambridge, Mass.

Schedule: M33 - Advanced Airport Security Systems

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10

Explosives Detection System (EDS) for Checked Baggage
- Contract Award
- Acceptance Test
- First Production System Delivery
- Last Production System Delivery
- Last Site Acceptance Test Completed
- Deploy 88 FAA-Certified Systems

Advanced Technology—Automated X-Ray and Quadrupole Resonance
- Contract Award
- Acceptance Test
- First Production System Delivery
- Last Site Acceptance Test Completed
- Last System Operational
- Last Production System Delivery

Trace Detection Equipment
- Initial Contract Awards
- Acceptance Test
- First Production System Delivery
- Last Production System Delivery
- Last Site Acceptance Test Completed
- Last System Operational
- Deploy 75 Trace Detection Devices
- Deploy 10 Trace Detection Passenger Screening Portals
- Deploy 40 Trace Detection Document Scanners

Computer Assisted Passenger Screening (CAPS)—Passenger Profiling
- Grant Award
- Grant Completed
- Acceptance Test
- Technology Transfer
- Contract Awards to Lead Carriers
- Last Major System Operational
- Last System Operational

Screener Proficiency Evaluation and Reporting System (SPEARS)
- Contract Award
- Acceptance Test
- First Production System Delivery
- 15th Production System Delivery
- Last Site Acceptance Test Completed
- Last System Operational

M34–Airport Technology

Program Description: Airport Technology supports multiple projects that will improve airport system safety, efficiency, and capacity by developing technologies that are compatible with the advancements in aircraft technology and air traffic control systems.

This program consists of the following projects:

- Reduction of aircraft accidents due to slipperiness caused by ice and snow on runways

- Minimizing the environmental effects of use of chemicals on airports during winter operations

- Compatibility of new, heavy aircraft with the existing runways

- Improving the post-crash rescue and firefighting capabilities

- Reducing the negative impact of wildlife on or near airports.

Various projects in this program are designed to develop standards and guidance material for design, construction, and maintenance of airports. Compatibility of new, heavy aircraft will be obtained by developing new pavement thickness design standards for both the FAA and the manufacturers: manufacturers need them to assure compatibility of their new aircraft on airports around the world; the FAA needs them to assure the public that Federal funds for rebuilding or strengthening the runways are being judiciously employed and also to protect the $100 billion investment in the infrastructure. To accomplish this, the FAA and the Boeing Company have entered into a cooperative agreement to build a unique full-scale pavement test facility at the FAA's Technical Center. The data collected from the facility will be used by the FAA, the Boeing Company, and the International Civil Aviation Organization in the development of international standards.

Near-term plans include:

- Complete construction and start operation of the national airport pavement test facility

- Complete machine facility acceptance tests and pavement response study on tridem (triple tandem) landing gear

- Continue collecting and analyzing data (from Denver and from machine facility) to relate performance to designs

- Continue evaluation of prototype advanced taxiway guidance system

- Publish testing standards for airport firefighting extinguishing agents

- Initiate study to develop new standards for anti-rollover and stability requirements for heavy airport rescue vehicles.

Products:

The airport advisory circular system is the principal means by which the FAA communicates with user community—the Nation's airport planners, designers, operators, and equipment manufacturers. Following is a list of current advisory circulars:

- Advisory circular on new specifications, materials, procedures, equipment, and techniques for airport rescue and firefighting

- Advisory circular on new automated pavement design procedures

- Advisory circular on airport geometry

- Advisory circular on airport pavement design

- Advisory circular on engineered materials (soft ground material) arresting systems

- Advisory circular on wildlife habitat management

- Advisory circulars on airport visual aids (lighting, markings, and signs).

1998 Accomplishments:

- Published report on the critical airport research requirements

- Published report on impacts of the introduction of new large aircraft

- Continued development of 3-dimensional finite element modeling of airport pavement structures

- Updated layered elastic design (LED)FAA pavement design software program package

- Completed joint load transfer and layer interface models and field performance of stabilized base materials

- Completed national airport pavement test machine design, and continued construction

- Continued data collection from instrumented runway section at Denver International Airport

- Published advisory circular on engineered materials arresting beds

- Developed means to acquire and report runway surface friction values for pilot use

- Completed installation and continued evaluation of prototype advanced taxiway guidance system

- Completed new technology approach lighting demonstration evaluation and issued report

- Issued specifications for improved airport signs and improved airport markings

- Developed full-scale post-crash interior fire suppression facility.

Contractors:

To be determined.

List of Interagency Partners:

- U.S. Army, Waterways Experiment Station Vicksburg, Miss.

- U.S. Air Force, Tyndall Air Force Base Panama City, Fla.

- NASA Langley Research Center
- USDA, Denver Wildlife Research Center Denver, Colo.

Schedule: M34 - Airport Technology

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
								Airport Safety Technology											
								Airport Planning and Design											
								Airport Pavement Technology											

M35–General Aviation and Vertical Flight Technology

Program Description: General Aviation (GA) fixed wing and rotary wing aircraft users need support from communications, navigation, and surveillance (CNS) technologies. These technologies support cost-effective air traffic services, improve safety, and expand the capacity and efficiency of the NAS—especially where CNS services are not currently available to GA users. General Aviation and Vertical Flight (GA&VF) products are an integral part of the NAS modernization effort.

GA users currently rely on existing procedures and air traffic services, but many cannot take full advantage because of technological and economic limitations.

The GA&VF program supports the full spectrum of GA operations, aligning with the most critical components for GA participation in the NAS-terminal operations:

- En route communications and navigation
- Landing facilities
- Airmen and controller training
- Low-cost avionics.

This program area is a collaborative and complementary effort, tailoring the successes and achievements of other, broader-scope efforts into affordable products and tangible benefits for general aviation. GA&VF supports specific strategic goals of the Government Performance and Results Act (GPRA):

- *Improved Level of Safety:* Mitigates the risk of low-altitude airborne collisions by adapting affordable GPS-based surveillance technology to GA use
- *Improved Flexibility:* Adapts free-flight technologies and procedures to allow GA users to operate at altitudes, speeds, and routes more supportive of their missions and recreational uses
- *Improved Predictability*: Improves access to weather services via data link and short-term weather information to GA users, allowing more aircraft to operate safely and in close proximity during periods of reduced visibility and adverse weather conditions
- *Reduced Delays*: Provides affordable and effective non-radar navigation and communications systems to more than 17,000 GA airports, attracting more GA users to these facilities and away from busier hub airports
- *Improved Access:* Makes available, through GPS, accurate navigation and landing signals in the large volume of low altitude airspace not currently covered by land-based landing signals
- *Reduced Costs:* Provides moderate-cost, low-altitude CNS equipment for GA users.

Products:

Although the private sector is responsible for the design and development of specific technologies to accomplish these outcomes, the general aviation and vertical flight technology program provides:

- Design criteria
- Advisory circulars and training documents
- Collaborative technology integration with the current and future NAS
- Technical and management expertise to establish highly successful partnerships.

1998 Accomplishments:

Air and Ground Infrastructure Development

- Completed initial flight testing for CAT I GPS precision approach terminal instrument procedures (TERPS) criteria
- Completed initial planning for the Alaska low-altitude demonstration project

- Completed obstacle-rich environment report

- Developed and published advisory circular—"Integrating Rotorcraft Assets Into Disaster Relief Planning"

- Coordinated the development of the "Vertiport Design Guide Advisory Circular."

Civil Tiltrotor Technology Analyses

- Initiated action to introduce tiltrotor technology into the NAS planning process.

Aircraft Avionics for Single Pilot IFR

- Coordinated and implemented agreement with Experimental Aircraft Association (EAA) to jointly explore advanced technology avionics for single pilot GA aircraft

- Conducted installation and flight test of advanced technology for avionics by GA aircraft in experimental GlaStar aircraft.

Sponsoring Organization:

- AFS-450, Technical Programs Division

Performing Organizations:

- AND-370, Satellite Navigation Product Team

- AND-710, General Aviation and Vertical Flight Product Team.

Contractors:

Not applicable.

Schedule: M35 - General Aviation and Vertical Flight Technology

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
						Low-Cost Avionics													
						Rotocraft Instrument Flight Rules Procedures													

M36–Alaska Capstone Initiative/Safe Flight 21

The two objectives of Capstone are to increase airline efficiency and increase airline safety by implementing nine operational enhancements. The systems engineering evaluation and certification of these enhancements will be accomplished at headquarters, while the regions will accomplish their own implementations. Capstone will be a major testbed for Global Positioning System (GPS)-driven systems that will then be deployed throughout the NAS.

Products:

- Weather and other information to cockpit

- Affordable means for reducing controlled flight into terrain

- Improved capability for approaches in low-visibility conditions

- Enhanced capability for seeing and avoiding adjacent traffic

- Enhanced capability for delegating aircraft separation authority to pilots

- Improved capability for pilots to navigate airport taxiways

- Enhanced capability for controllers to manage aircraft and vehicular traffic on airport surface

- Surveillance coverage in non-radar airspace

- Improved separation standards.

Sponsoring Organizations:

- ATO-470, Operations Planning Division

- AFS-400, Technical Programs Division.

Performing Organization:

- AND-470, Safe Flight 21 Product Team.

Contractors

- Lincoln Laboratory
  Lexington, Mass.

- MITRE
  McLean, Va.

- Volpe
  Cambridge, Mass.

Schedule: M36 - Alaska Capstone Initiative/Safe Flight 21

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
										Flight Information Services									
									Controlled Flight Into Terrain										
								Enhanced See and Avoid											

M37–Cockpit Technology

Program Description: As the density of air traffic in the NAS increases and as migration to Free Flight occurs, the FAA needs to improve system safety by implementing a viable airborne collision avoidance capability to mitigate the risk of mid-air collisions.

The Traffic Alert and Collision Avoidance System (TCAS) is an avionics capability to warn pilots of nearby aircraft and to provide information and guidance for collision avoidance. TCAS I provides traffic advisory information indicating the range, bearing, and altitude of intruding aircraft. Pilots use this information to visually acquire intruders and maintain separation. TCAS II provides traffic advisory information as well as resolution advisories in the vertical plane. Resolution advisories indicate maneuvers (e.g., CLIMB) for collision avoidance.

Products:

- Technical characteristics (technical standard orders (TSO)) for TCAS avionics

- Certification guidance (advisory circulars (AC)) for installation and operation of the system.

1998 Accomplishments:

- TCAS II, as required by regulation, was installed in all commercial aircraft with more than 30 passenger seats, operating in U.S. airspace

- TCAS I or TCAS II, as required by regulation, was installed in all commercial aircraft with 10 to 30 passenger seats, operating in U.S. airspace

- TCAS II, as required by regulation, began on all large U.S. military transport category aircraft.

Sponsoring Organization:

- AFS-400, Technical Programs Division

Performing Organization:

- AND-720, Aeronautical Data Link Team, IPT for Aircraft, Avionics and Navigation Systems.

Contractors

Not applicable.

Schedule: M37 - Cockpit Technology

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
								TCAS I											
								TCAS II											

New Mission Support Needs (2001–2004)

New mission support needs requiring funding in the next 5 years include:

- Replacing R&D aircraft

- Decommissioning various facilities and equipment

- Providing technology refresh for various mission support automation systems

- Supporting system-level integration of various NAS programs.

Actual requirements will be addressed through the Acquisition Management System.